WHAT IS CLAIMED IS:

1. A chromatic dispersion compensation module comprising,

an enclosure (49) including an input terminal (41) and an output terminal (42),

a chromatic dispersion compensation optical line (40) situated inside the enclosure and connecting the input terminal to the output terminal, the line comprising one or more chromatic dispersion compensation single-mode optical fibers (43, 45) in series and not comprising any HOM multimode optical fiber,

the module being adapted to be inserted by means of the input and output terminals into a transmission line comprising a standard single-mode line optical fiber adapted to transmit information in a spectral domain of use,

the input terminal introducing into the transmission line an input loss $\Gamma_{in}$ expressed in dB,

the output terminal introducing into the transmission line an output loss $\Gamma_{out}$ expressed in dB,

additional connections, if any, between compensation optical fibers together introducing into the transmission line a connection loss $\Gamma_{inter}$ expressed in dB,

the compensation optical fiber or the set of compensation optical fibers in series having, at a wavelength of 1550 nm, a plurality of average parameters including an average coefficient of attenuation $\alpha_{DCF}$ expressed in dB/km, a negative average chromatic dispersion $D_{DCF}$ expressed in ps/nm-km, a negative average dispersion slope $S_{DCF}$ expressed in ps/nm$^2$-km, an average chromatic dispersion to dispersion slope ratio $D_{DCF}/S_{DCF}$ expressed in nm, an average figure of merit $FOM_{DCF}$ defined as $-D_{DCF}/\alpha_{DCF}$ expressed in ps/nm-dB, an average effective area $A_{eff}$ expressed in $\mu m^2$, and an average second order coefficient $n_2$ of the refractive index as a function of the intensity expressed in $10^{-20} m^2/W$,

the average chromatic dispersion to dispersion slope ratio being the ratio between the average chromatic dispersion and the average dispersion slope,

the average figure of merit being the negative of the ratio between the average chromatic dispersion and the average coefficient of attenuation,.

the average coefficient of attenuation in the case of a single compensation optical fiber being lumped with the corresponding coefficient of attenuation of said single compensation optical fiber and in the case of a set of compensation optical fibers in series, the average coefficient of attenuation is equal to the sum of the corresponding attenuation coefficients of the various compensation optical fibers weighted by their respective contributions to the total series length of the compensation optical fibers plus the ratio of the connection loss divided by said total length,

each of said other average parameters in the case of a single compensation optical fiber being lumped with the corresponding parameter of said single compensation optical fiber and each of said other average parameters in the case of a set of compensation optical fibers in series being the arithmetic mean of the corresponding parameters of the various compensation optical fibers when weighted by the respective lengths of said various compensation optical fibers,

the module having insertion losses IL expressed in dB,

where $IL = \frac{D_{DCM}}{D_{DCF}} \cdot \alpha_{DCF} + \Gamma_{in} + \Gamma_{out}$

and where $D_{DCM}$ = -1360 ps/nm,

the module having a non-linearity criterion NLC representing the effects of the non-linear phase and expressed in $10^{-6}$km/W-dB,

where $NLC = \frac{100 \cdot n_2 \cdot (1 - 10^{\frac{D_{DCM}}{10 \cdot FOM_{DCF}}})}{A_{eff} \cdot \alpha_{DCF} \cdot 10^{\frac{\Gamma_{in}}{10}}}$,

the module having a quality criterion CQ expressed in dB,

where $CQ = IL + 10\log NLC$,

the module having a quality-to-price ratio criterion CQ2 expressed in dB,

where $CQ2 = CQ + B\log(FOM_{DCF})$

and where B = 18,

and the compensation optical fiber or the set of compensation optical fibers in series having,

firstly, average chromatic dispersion more negative than -130 ps/nm-km,

secondly, average chromatic dispersion to dispersion slope ratio in the range 240 nm to 400 nm, and

thirdly, for a given average figure of merit, average attenuation sufficiently high for the quality criterion to be less than 20.5 dB and the quality-to-price ratio criterion to be less than 61.3 dB.

2. A module according to claim 2, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the quality criterion to be less than 18.5 dB.

3. A module according to claim 2, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the quality criterion to be less than 17.5 dB.

4. A module according to either claim 1 or claim 2, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the quality-to-price ratio criterion to be less than 60.8 dB.

5. A module according to claim 4, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the quality-to-price ratio criterion to be less than 60.3 dB.

6. A module according to claim 1, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the non-linearity criterion expressed in $10^{-6}$km/W-dB to be less than 15.

7. A module according to claim 6, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the non-linearity criterion expressed in $10^{-6}$km/W-dB to be less than 13.

8. A module according to claim 1, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has a module optimization criterion COM expressed in $10^{10}$dB$^2$-W/s which is greater than 2, where

$$COM = \frac{100 \cdot \alpha_{DCF} \cdot A_{eff}}{n_2 \cdot FOM_{DCF}}.$$

9. A module according to claim 8, characterized in that the module optimization criterion is greater than 2.5.

10. A module according to claim 1, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has an average figure of merit in the range 200 ps/nm-dB to 250 ps/nm-dB.

11. A module according to claim 1, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has an average attenuation greater than 0.9 dB/km.

12. A module according to claim 10, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has an average attenuation greater than 1.1 dB/km.

13. A module according to claim 1, characterized in that it has a loss distribution criterion CRP less than 30%, where

$$CRP = 1 - \frac{2IL}{CQ}.$$

14. A module according to claim 13, characterized in that the loss distribution criterion is less than 23%.

15. A module according to claim 1, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has an average chromatic dispersion to dispersion slope ratio in the range 270 nm to 370 nm.

16. A chromatic dispersion compensation module comprising,

an enclosure (49) including an input terminal (41) and an output terminal (42),

a chromatic dispersion compensation optical line (40) situated inside the enclosure and connecting the input terminal to the output terminal, the line comprising one or more chromatic dispersion compensation single-mode optical fibers (43, 45) in series and not comprising any HOM multimode optical fiber,

the module being adapted to be inserted by means of the input and output terminals into a transmission line

comprising a non-zero dispersion at 1550 nm single-mode dispersion shifted line optical fiber adapted to transmit information in a spectral domain of use,

the input terminal introducing into the transmission line an input loss $\Gamma_{in}$ expressed in dB,

the output terminal introducing into the transmission line an output loss $\Gamma_{out}$ expressed in dB,

additional connections, if any, between compensation optical fibers together introducing into the transmission line a connection loss $\Gamma_{inter}$ expressed in dB,

the compensation optical fiber or the set of compensation optical fibers in series having, at a wavelength of 1550 nm, a plurality of average parameters including an average coefficient of attenuation $\alpha_{DCF}$ expressed in dB/km, a negative average chromatic dispersion $D_{DCF}$ expressed in ps/nm-km, a negative average dispersion slope $S_{DCF}$ expressed in ps/nm$^2$-km, an average chromatic dispersion to dispersion slope ratio $D_{DCF}/S_{DCF}$ expressed in nm, an average figure of merit $FOM_{DCF}$ defined as $-D_{DCF}/\alpha_{DCF}$ expressed in ps/nm-dB, an average effective area $A_{eff}$ expressed in $\mu m^2$, and an average second order coefficient $n_2$ of the refractive index as a function of the intensity expressed in $10^{-20}m^2/W$,

the average chromatic dispersion to dispersion slope ratio being the ratio between the average chromatic dispersion and the average dispersion slope,

the average figure of merit being the negative of the ratio between the average chromatic dispersion and the average coefficient of attenuation,

the average coefficient of attenuation in the case of a single compensation optical fiber being lumped with the corresponding coefficient of attenuation of said single compensation optical fiber and in the case of a set of compensation optical fibers in series, the average coefficient of attenuation is equal to the sum of the corresponding attenuation coefficients of the various compensation optical fibers weighted by their respective

contributions to the total series length of the compensation optical fibers plus the ratio of the connection loss divided by said total length,

each of said other average parameters in the case of a single compensation optical fiber being lumped with the corresponding parameter of said single compensation optical fiber and each of said other average parameters in the case of a set of compensation optical fibers in series being the arithmetic mean of the corresponding parameters of the various compensation optical fibers when weighted by the respective lengths of said various compensation optical fibers,

the module having insertion losses IL expressed in dB,

where $IL = \frac{D_{DCM}}{D_{DCF}} \cdot \alpha_{DCF} + \Gamma_{in} + \Gamma_{out}$

and where $D_{DCM}$ = -680 ps/nm,

the module having a non-linearity criterion NLC representing the effects of the non-linear phase and expressed in $10^{-6}$km/W-dB,

where $NLC = \frac{100 \cdot n_2 \cdot (1 - 10^{\frac{D_{DCM}}{10 \cdot FOM_{DCF}}})}{A_{eff} \cdot \alpha_{DCF} \cdot 10^{\frac{\Gamma_{in}}{10}}}$,

the module having a quality criterion CQ expressed in dB,

where $\mathrm{CQ} = \mathrm{IL} + 10 \log \mathrm{NLC}$,

the module having a quality-to-price ratio criterion CQ2 expressed in dB,

where $\mathrm{CQ2} = \mathrm{CQ} + \mathrm{B} \log(\mathrm{FOM}_{\mathrm{DCF}})$

and where B = 23,

and the compensation optical fiber or the set of compensation optical fibers in series having,

firstly, average chromatic dispersion more negative than -115 ps/nm-km, and

secondly, for a given average figure of merit, average attenuation sufficiently high for the quality

criterion to be less than 18 dB and the quality-to-price ratio criterion to be less than 66.6 dB.

17. A module according to claim 16, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the quality criterion to be less than 15 dB.

18. A module according to claim 17, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the quality criterion to be less than 13 dB.

19. A module according to either claim 16 or claim 17, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the quality-to-price ratio criterion to be less than 66.1 dB.

20. A module according to claim 19, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the quality-to-price ratio criterion to be less than 65.6 dB.

21. A module according to claim 16, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the non-linearity criterion expressed in $10^{-6}$km/W-dB to be less than 7.5.

22. A module according to claim 21, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has, for a given average figure of merit, average attenuation that is sufficiently high for the non-linearity criterion expressed in $10^{-6}$km/W-dB to be less than 6.5.

23. A module according to claim 16, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has a module optimization criterion COM expressed in $10^{10}$dB$^2$-W/s which is greater than 3, where

$$COM = \frac{100 \cdot \alpha_{DCF} \cdot A_{eff}}{n_2 \cdot FOM_{DCF}}.$$

24. A module according to claim 23, characterized in that the module optimization criterion is greater than 4.

25. A module according to claim 16, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has an average figure of merit in the range 170 ps/nm-dB to 220 ps/nm-dB.

26. A module according to claim 16, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has an average attenuation greater than 1.1 dB/km.

27. A module according to claim 26, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has an average attenuation greater than 1.3 dB/km.

28. A module according to claim 16, characterized in that it has a loss distribution criterion CRP less than 35%, where

$$CRP = 1 - \frac{2IL}{CQ}.$$

29. A module according to claim 28, characterized in that the loss distribution criterion is less than 28%.

30. A module according to claim 16, characterized in that the compensation optical fiber or the set of compensation optical fibers in series has an average chromatic dispersion to dispersion slope less than 200 nm.

31. A module according to either claim 1 or claim 16, characterized in that the compensation optical line consists of a single optical fiber connecting the input terminal to the output terminal.

32. A module according to either claim 1 or claim 16, characterized in that the compensation optical line comprises a plurality of optical fibers of the same family, that is to say either a plurality of segments of the same optical fiber or a plurality of optical fibers that are similar within their fabrication tolerances.

33. A module according to either claim 1 or claim 16, characterized in that the compensation optical line comprises a plurality of separate optical fibers and in that the spectral domain of use comprises at least two of spectral bands S, C and L.

34. A signal amplification and chromatic dispersion compensation system comprising in succession a first signal amplifier (2), a signal attenuator (3), a chromatic dispersion compensation module (4) according to claim 1, and a second signal amplifier (5).

35. A transmission line comprising in succession a single-mode line optical fiber (1) adapted to transmit

information in a spectral domain of use and a signal amplification and chromatic dispersion compensation system (6) according to claim 34.

36. A method of designing a chromatic dispersion compensation module,

said module being adapted to comprise,

an enclosure including an input terminal and an output terminal,

a chromatic dispersion compensation optical line situated inside the enclosure and connecting the input terminal to the output terminal, the line comprising one or more chromatic dispersion compensation single-mode optical fibers in series and not comprising any HOM multimode optical fiber,

said module being adapted to be inserted by means of the input and output terminals into a transmission line comprising a single-mode line optical fiber adapted to transmit information in a spectral domain of use,

the input terminal introducing into the transmission line an input loss $\Gamma_{in}$ expressed in dB,

the output terminal introducing into the transmission line an output loss $\Gamma_{out}$ expressed in dB,

additional connections, if any, between compensation optical fibers together introducing into the transmission line a connection loss $\Gamma_{inter}$ expressed in dB,

the compensation optical fiber or the set of compensation optical fibers in series having, at a wavelength of 1550 nm, a plurality of average parameters including an average coefficient of attenuation $\alpha_{DCF}$ expressed in dB/km, a negative average chromatic dispersion $D_{DCF}$ expressed in ps/nm-km, a negative average dispersion slope $S_{DCF}$ expressed in ps/nm$^2$-km, an average chromatic dispersion to dispersion slope ratio $D_{DCF}/S_{DCF}$ expressed in nm, an average figure of merit $FOM_{DCF}$ defined as $-D_{DCF}/\alpha_{DCF}$ expressed in ps/nm-dB, an average effective area $A_{eff}$ expressed in $\mu$m$^2$, and an average second order

coefficient $n_2$ of the refractive index as a function of the intensity expressed in $10^{-20} m^2/W$,

the average chromatic dispersion to dispersion slope ratio being the ratio between the average chromatic dispersion and the average dispersion slope,

the average figure of merit being the negative of the ratio between the average chromatic dispersion and the average coefficient of attenuation,

the average coefficient of attenuation in the case of a single compensation optical fiber being lumped with the corresponding coefficient of attenuation of said single compensation optical fiber and in the case of a set of compensation optical fibers in series, the average coefficient of attenuation is equal to the sum of the corresponding attenuation coefficients of the various compensation optical fibers weighted by their respective contributions to the total series length of the compensation optical fibers plus the ratio of the connection loss divided by said total length,

each of said other average parameters in the case of a single compensation optical fiber being lumped with the corresponding parameter of said single compensation optical fiber and each of said other average parameters in the case of a set of compensation optical fibers in series being the arithmetic mean of the corresponding parameters of the various compensation optical fibers when weighted by the respective lengths of said various compensation optical fibers,

said module being adapted to have insertion losses IL expressed in dB,

where $IL = \frac{D_{DCM}}{D_{DCF}} \cdot \alpha_{DCF} + \Gamma_{in} + \Gamma_{out}$

and where $D_{DCM}$ represents the negative of the cumulative dispersion of the line optical fiber,

said module being adapted to have a non-linearity criterion NLC representing the effects of the non-linear phase and expressed in $10^{-6}$km/W-dB,

where $$NLC = \frac{100 \cdot n_2 \cdot (1 - 10^{\frac{D_{DCM}}{10 \cdot FOM_{DCF}}})}{A_{eff} \cdot \alpha_{DCF} \cdot 10^{\frac{\Gamma_{in}}{10}}},$$

said module being adapted to have a quality criterion CQ expressed in dB,

where $CQ = IL + 10 \log NLC$,

said design method including an optimization step for optimizing said module, said optimization step consisting in reducing the quality criterion at a chosen constant average figure of merit by increasing the average attenuation.